

YEAR 1909

Ten storms were found to have occurred in 1909. Tracks for these storms are presented in Fig. 1.

Storm 1, 1909 (Jun. 25-30), T. S.

The following information was found in relation to this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Jun. 25, Key West, S.S.W. f. 3, 29.90; ship near 24.7 N., 83 W., S.S.W. f. 4, 29.90; ship near 20 N., 83 W., S.W. f. 3, 29.88; ship near 25 N., 84 W., N.N.W. f. 2, pressure could not be read, rain; ship near 25 N., 85 W., N.E. f. 4, 30.06 (too high); ship near 23.3 N., 87 W., N.W. f. 3, 29.91. Jun. 26, ship near 23 N., 86 W., W.S.W. f. 2, 29.94; ship near 24.7 N., 83 W., S. f. 4, 29.96; ship near 26.8 N., 90 W., S.W. f. 8, 29.86 (position appears to be wrong); Port Eads, N.E. f. 3, 29.90. Jun. 27, Port Eads, S.E. f. 5, 29.91; ship near 27 N., 87 W., S. f. 5, pressure could not be read, rain; ship near 27.7 N., 86 W., S.E. f. 6, 29.97; ship near 26.8 N., 91 W., E. f. 3, 29.86; low placed 25.5 N., 91 W.. Jun. 28, ship near 25 N., 90 W., S.S.W. f. 5, 29.88; Port Eads, S.E. f. 3, 29.91, showers; ship near 21 N., 95 W., S.W. f. 1, 29.91; Galveston, N. f. 3, 29.96; Tampico, calm, 29.82; Brownsville, E. no speed, 29.94. Jun. 29, Galveston, N. f. 6, 29.83; Corpus Christi, N.W. f. 3, 29.82; ship near 28 N., 91 W., E.S.E. f. 3. Jun. 30, Brownsville, W. no speed, barometer could not be clearly read but likely to be 29.72; Corpus Christi, N. f. 6, 29.69; Galveston, N.E. f. 4, 29.86; center placed just N.E. of Brownsville, but to the E.S.E. and quite close to Corpus Christi appears to be a much better location (Historical Weather Maps, Jun. 1909). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 2) The only storm of the month (according to the New Orleans forecast district) appeared off the mouth of the Rio Grande River on Jun. 30, and storm warnings were ordered for the Texas coast. The storm moved westward into Mexico and reports indicate that it was the most severe that have visited the section near the mouth of the Rio Grande in several years. I.M. Cline, District Forecaster (Monthly Weather Review, Jun. 1909) Author's note: The storm center made landfall on the Lower Texas coast and not on the Mexican coast. 3) Maximum wind velocities associated with the storm were: Corpus Christi, N.E. 48 mph on Jun. 30; Galveston, N.E. 40 mph on Jun. 29 (Monthly Weather Review, Jun. 1909. 4) Minimum pressure at Corpus Christi was 29.65 inches (Weather Bureau, 1911). Author's note: Apparently this value was not corrected to sea level. 5) Brownsville, Tx., Jun. 30. Tarpon Beach, a summer resort at the end of Padre Island, is isolated and inundated and the fate of the inhabitants is problematic. A storm of extraordinary severity raged here today with water 5-ft deep still rising when the last wire was lost (The Tampa Morning Tribune, Jul. 1, 1909, p.1, col.3). 6) Storm of Jun. 30, 1909. Lower Texas coast. Minor (Dunn and Miller, 1960). 7) A storm was first observed near 25 N., 84 W. on Jun. 25, 1909 and lasted 5 days; it was last observed near 27 N., 98 W. (Mitchell, 1924). Author's note: Tracks for this storm in Tannehill (1993) and in Neumann et al. (1993) were found to be quite similar to the corresponding track in Mitchell (1924).

On the basis of information contained in the above items, particularly in item 1), the author of this study introduced some modifications along the storm track shown in Neumann et al. (1993). Their 7 A.M. Jun. 25 position was kept unchanged because it was found to fit information in item 1). Author's 7 A.M. positions for the period Jun. 26-30 were estimated as follows: Jun. 26, near 26.7 degrees N., 87.0 degrees W.; Jun. 27, near 27.0 degrees N., 90.0 degrees W.; Jun. 28, near 27.0 degrees N., 92.5 degrees W.; Jun. 29, near 27.0 degrees N., 94.7 degrees W.; Jun. 30, near 27.0 degrees N., 97.0 degrees W. The difference between these positions and the corresponding ones in Neumann et al. (1993) was found to range from about 90 miles on Jun. 27 to about 45 miles on Jun. 29. With the exception of Jun. 30, author's positions were to the N. of those shown in the above publications. The author's track for Storm 1, 1909 is shown in Fig. 1.

The tropical storm status which Neumann et al. (1993) gave to this storm was supported by the maximum wind velocities of 48 mph at Corpus Christi and 40 mph at Galveston (item 3) and by the minimum pressure of 29.65 inches reported at Corpus Christi (item 4). As in Neumann et al. (1993), the author's track indicated tropical storm intensity over the period Jun. 25-30, and

the tropical depression (dissipation) stage was introduced along the track after the storm made landfall on the Texas coast.

Storm 2, 1909 (Jun. 27- Jul. 4), T. S.

The following information was found about this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Jun. 26, no data; Jun. 27, ship or Cuban station near 21 N., 76 W., W. f. 1, 29.83; Jupiter, N. f. 2, 30.03; no other data in the storm area. Jun. 28, Jupiter, N.N.E. f. 3, 29.91; Key West, N. f. 2, 29.96; ship near 23 N., 79 W., S.S.W. f. 5, 29.80, wind maybe too high. Jun. 29, Tampa, N.N.W. f. 2, 29.77; Jupiter, S.W. f. 5, 29.88; Jacksonville, E. f. 4, 29.87; Thomasville (N.E. of Tallahassee), N.E. f. 3, 29.91. Jun. 30, Tampa, S. f. 5; Thomasville, N.E. f. 3, barometer could not be clearly read but probably 29.73; Jacksonville, S.S.E. f. 4, 29.88; center placed 28.5 N., 85 W., but 30 N., 84 W. is a much better location (Historical Weather Maps, Jun., 1909). Author's note: In this item and in item 2), wind forces (f) are on Beaufort scale and pressures are in inches. 2) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Jul. 1, Thomasville, S.E. f. 2, 29.79, rain; Montgomery, N.E. f. 2, 29.84; ship near 26 N., 86 W., W.S.W. to S.W. f. 6, 29.81; Pensacola, N.W. f. 2, 29.82. Jul. 2, Jacksonville, S. to S.S.W. f. 5, 29.81; Thomasville, N.W. f. 3, 29.79; Charleston, S.S.W. f. 3, 29.84; Atlanta, N.N.W. f. 3, 29.85; low apparently embedded in a weak trough in the westerlies over Ga. and S.C. Jul. 3, Jacksonville, W. f. 2, 29.72; Charleston, N.E. f. 4, 29.68; low apparently off Charleston. Jul. 4, ship near 29 N., 74 W., S.W. f. 7, 29.77; low apparently near 30.3 N., 74.5 W.. Jul. 5, system no longer identified (Historical Weather Maps, Jul. 1909). 3) Washington, Jun. 29. "Storm over Florida, gaining in intensity and moving northward, winds increasing in South Atlantic States. Moore" The brief message is reproduced as coming to Observer Blackman from the Weather Bureau of Washington. There was every indication yesterday that the winds at sea (off Miami) were high (The Miami Metropolis, Jun. 29, 1909, p.1, col.1). 4) One of the severest rain and wind storms in many months swept the entire area between 6 P.M. yesterday and 10 P.M. last night. The heaviest downpour was between 7 and 8 P.M., when business houses were closing for the day and many were caught downtown and forced to remain nearly 9 P.M. Although no official report has yet been made by the Weather Bureau as to the velocity of the wind, it is estimated as from 25 to 40 mph. There was considerable damage to crops, telegraph and telephone wires and small craft that happened to be caught in exposed places. In some sections of the city (Tampa) window panes were blown in and there were many uneasy residents (The Tampa Morning Tribune, Jun. 30, 1909, p.1, col.6). 5) For 6 hours Tuesday night (Jun. 29), the wind in Tampa remained at a velocity exceeding 30 mph, while at 8:30 P.M. it was blowing at a rate of 40 mph. Key West was affected by the storm before it reached Tampa. Reports from Bartow yesterday morning (Jun. 30) stated that water was standing on the streets from the rain and that Lakeland was visited in similar fashion. According to the captain of the government ship "Pickering", the winds at the keys (off Tampa) reached a very high velocity that it was probably much greater than in the city (The Tampa Morning Tribune, Jul. 1, 1909, p.5, cols. 5-6). 6) Maximum velocity at Tampa was S.W. 40 mph on Jun. 29; at Key West, it was N.W. 32 mph on Jun. 28 (Monthly Weather Review, Jun. 1909). 7) Minimum pressure at Tampa (apparently without correction to sea level) was 29.72 inches (Weather Bureau, 1911). 8) Track for the storm starting near 25 N., 79 W. in the evening of Jun. 27 and ending near 31 N., 86 W. in the evening of Jun. 30 (Monthly Weather Review, Jun. 1909). Author's note: This track was continued in Monthly Weather Review, Jul. 1909, as follows: morning of Jul. 1, near 31 N., 84.5 W.; morning of Jul. 2, near 31.5 N., 83 W.; morning of Jul. 3, just S.S.E. of Charleston; morning of Jul. 4, off the coast between Charleston and Wilmington, after having been inland (near the S.C.-N.C. border) in the evening of Jul. 3. 9) A storm was first observed near 22 N., 73 W. on Jun. 26, 1909 and lasted 5 days; it was last observed near 31 N., 89 W. (Mitchell, 1924). Author's note: The track in Tannehill (1938) was found to be quite similar to the one in Mitchell (1924); the track in Neumann et al. (1993) was also similar to the one in the Mitchell (1924).

Primarily on the basis of information in items 1) and 2), the author of this study introduced a number of modifications along the track in Neumann et al. (1993) and extended his storm track

for Storm 2 , 1909 to July 4. The author's track was started on Jun. 27 or one day later than in Neumann et al. (1993); the author's 7 A.M. Jun. 27 position was estimated near 22.0 degrees N., 76.0 degrees W. and was found to be about 180 miles to the S.S.E. of the position for that day in the above publication. Author's 7 A.M. positions for the period Jun. 28- Jul. 4 were estimated as follows: Jun. 28, near 25.0 degrees N., 79.3 degrees W.; Jun. 29, near 28.0 degrees N., 81.7 degrees W.; Jun. 30, near 30.0 degrees N., 84.0 degrees W.; Jul. 1, near 31.0 degrees N., 84.7 degrees W.; Jul. 2, near 32.0 degrees N., 83.5 degrees W.; Jul. 3, near 32.3 degrees N., 79.7 degrees W.; Jul. 4, near 30.3 degrees N., 74.5 degrees W. For the period Jun. 28- Jul. 1, the difference between 7 A.M. positions along the author's track and corresponding ones in Neumann et al. (1993) ranged from about 270 miles on Jul. 1 to about 75 miles on Jun. 29-30. The author's track for Storm 2, 1909 is displayed in Fig. 1.

The tropical storm status which Neumann et al. (1993) gave to this storm was found to be supported by the maximum wind velocity of 40 mph reported to have occurred at Tampa (items 5 and 6). Tropical storm intensity was shown along the author's track for the period Jun. 27-30 and the tropical depression (dissipation) stage was introduced on Jul. 1 and kept until Jul. 4. Some slight intensification appeared to have occurred after the system moved back over Atlantic waters; this was suggested by a ship observation on Jul. 4 (item 2) but, as there was no evidence of reintensification to tropical storm status and the system could not be identified on Jul. 5 (item 2), the maintenance of the tropical depression (dissipation) stage was fully justified.

Storm 3, 1909 (Jul. 17-22), H.

The following information was found about this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Jul. 13-17, no indication of a closed cyclonic circulation was shown by the Caribbean data which were rather sparse. Jul. 17, Kingston, S.E. f. 4, 29.91; Havana, E. f. 3, 30.01; ship near 12 N., 78 W., S. f. 3, 29.86; ship near 21 N., 84 W., E. f. 2. Jul. 18, ship near 23 N., 86 W., N.E. f. 4, 29.83 (probably too low); ship near 22 N., 87 W., N.E. to N.N.E. f. 2, 29.97; Havana, S.E. f. 4, 29.97; ship near 21 N., 82 W., S. f. 6, 29.88; low placed 18.5 N., 85.5 W. (too far S. and W.). Jul. 19, ship near 26 N., 86 W., S.E. 10, 29.71, rain; ship off Cape San Antonio, S. f. 4, 29.94; center placed 25 N., 86.5 W., probably a bit E. Jul. 20, Port Eads, E. f. 4, 29.91; ship near 26 N., 87 W. S. f. 6, 29.94; center placed 25.5 N., 90 W., probably too far S. and a bit E. Jul. 21, Galveston, N. f. 5, 29.76; Corpus Christi, N.W. f. 3, 29.92; ship near 27 N., 90 W., S. f. 7, 30.09 (maybe too high), lightning; center placed 28 N., 94 W. Jul. 22, San Antonio, S. f. 5, 29.84; center inferred not far from 30 N., 100 W., with a station to the S.W. of that location having calm, 29.84 (Historical Weather Maps, Jul. 1909). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 2) Belen College Observatory, Jul. 17, 5 P.M. This morning's observations showed a cyclonic perturbation in its formative stage to the S.W. of Jamaica and S.E. of Grand Cayman. According to "ordinary laws", the probable course of the depression will be W.N.W., passing to the Gulf (of Mexico) through the vicinity of the Yucatan Channel (Diario de la Marina, Havana, Jul. 18, 1909, morning edition, p.5, col.1). 3) At 2 P.M. yesterday Luis G. Carbonell, Chief of the National Meteorological Observatory informed the following via telephone: "There is a cyclonic perturbation to the W. of Jamaica. It appears to be moving towards the Yucatan Channel. So far, it is of weak intensity" (Diario de la Marina, Havana, Jul. 18, 1909, morning edition, p.5, col.1). 4) Belen College Observatory. Last Saturday , Jul. 17 at 5 P.M. we published in the local press that there were some indications of a cyclonic perturbation to the S.W. of Jamaica and S.E. of Grand Cayman, adding at 2 P.M. Sunday (Jul. 18) that the principal center was then to the W. one quarter to the S.W. of Havana, passing through the extreme western Cuba into the Gulf of Mexico. As a confirmation we has just received at 1:45 P.M. (Jul. 21) the following cablegram from Mr. Moore, Chief of the Weather Bureau of Washington: "It has been advised that the perturbation observed over the Caribbean Sea on Saturday (Jul. 17) is now approaching the Texas coast near Galveston; the storm is very severe and it will probably pass inland to the W. of Galveston". M. Gutierrez-Lanza, S.J., Assistant Director (Diario de la Marina, Havana, Jul. 22, 1909, morning edition, p. 4, col.5). Author's note: A similar telegram from the Weather Bureau

was also received by the National Meteorological Observatory (of Cuba) and published in the same issue of *Diario de la Marina*. 5) Batabano, Jul. 19, 8:30 A.M. It has been raining heavily and persistently over 2 days, with high winds and rough seas. Several vessels have sunk but there were no casualties. Water is one-yard deep in some streets (*Diario de la Marina*, Havana, Jul. 19, 1909, evening edition, p.4, col.6). Author's note: Batabano is located on the southern coast of Havana province. 6) Washington, Jul. 16. Conditions along the Gulf coast remain unsettled owing to the presence over the Gulf of Mexico of a disturbance that has moved there from the Caribbean Sea (*The New York Times*, Jul. 20, 1909, p.12, col.7). 7) Washington, Jul. 21. The storm from the Gulf has passed inland, the vortex apparently passing near Galveston about noon Wednesday (Jul. 21). It is probable that the storm will mitigate rapidly as it passes. Daily advices regarding the presence of this storm over the Caribbean Sea and the Gulf of Mexico have been furnished shipping interests during the last 5 days (*The New York Times*, Jul. 22, 1909, p.13, col.7). Author's note: The above statement was probably issued in the evening of Jul. 21. 8) From a report by W.F. Berg, master of the steamship "Paraguay" on voyage from Sabine Pass, Tx. to Marcus Hook, Pa.: We left Sabine Pass on Jul. 18 at 6 P.M.. By 8 P.M. (Jul. 19) the wind had increased in force to a strong gale (from the northward). Our lat. at noon was 28 27 N., long. 91 16 W.; at midnight (Jul. 19-20) the skies had become overcast. At 8 A.M. Jul. 20 the wind was still from the northward, blowing a strong gale, with frequent heavy squalls, heavy rain and heavy cross sea. At 10 A.M. the wind died away altogether. At 11 A.M. the barometer read 29.10 inches (lowest) and the wind sprang up from the southward blowing full hurricane force, accompanied by very heavy rain, lasting until nearly 4 P.M. without a perceptible break. About 4 P.M. the weather became squally, the squalls gradually becoming less violent until at midnight we were able to proceed on our course, the wind at that time being a strong S.E. breeze with a clear sky and rough seas (*Monthly Weather Review*, Jul. 1909). Author's note: A series of barometer readings was also included, showing that the pressure dropped from 30.08 inches at 4 P.M. Jul. 19 to 29.10 inches at 10 A.M. Jul. 20, then rising to 29.13 at noon and to 29.90 at 8:50 P.M. The readings were taken from the aneroid barometer which was compared with the standard barometer at Philadelphia Pa. and was found to read 0.02 inches too high. Therefore, the lowest pressure reported by the "Paraguay" was 29.08 inches, after applying the proper correction. 9) The steamer "El Siglo" met with the storm on Monday (Jul. 19) and had to fight her way for 12 hours. The storm began with a succession of heavy showers, first from the E. and then from the S.E. and it finally resolved itself into a whirling gale which made the ship danced until it scudded eastward (*The New York Times*, Jul. 24, 1909, p.14, col.4). 10) The lowest corrected reading on land, 29.00 inches, was observed at Bay City, Tx. at 2:30 P.M. Jul. 21. The maximum time at which the center of the storm appears to have passed a given point has been estimated at one hour, this would make the diameter of the center 10 miles, but it is probable that the diameter increased rapidly over land and was much smaller over the Gulf... At Angleton, high northerly winds prevailed during the forenoon of Jul. 21. It shifted to the S.E. and S. about 12:30 P.M. and immediately attained hurricane force. There was some clearing of the sky, but only a slight lull in the wind. At Velasco, which had been a town of 600 people, apparently one-half of the town was destroyed. There was a calm of 45 minutes and for a few minutes the sun came out. The wind shifted to S. about 12:30 P.M.... At Brazoria, the wind in the morning was N.W. by N.. After 10 A.M. it increased suddenly in violence. About noon there was a lull for almost one hour; then the return wind struck fast and fierce... The center of the storm passed over El Campo, TX., where there was a lull in the wind from about 4:20 P.M. to 4:40 P.M., when the wind blew from a nearly opposite direction. (Barometer readings were lowest, 29.33 inches, at 2 P.M. and 4 P.M., with a rise to 29.45 inches at 3 P.M. All readings seem to be from 0.2 to 0.3 inch too high)... At Hattlettsville, Tx., about 3 P.M. the wind refreshed from a northerly direction, with an already cloudy sky and continued to gain in velocity. The barometer continued to fall and by 5 P.M. the storm was upon the town increasing in force until about 8:30, when the barometer ceased to fall, remaining stationary for a few minutes, and then began to rise with great rapidity. After this the wind slowly abated and by 9:30 P.M. had shifted, by way of W. and S., to the S.E., where it died away (*Monthly Weather Review*, Jul. 1909). Author's note: Information for Velasco and Bay City was also published in Tannehill (1938) and a short summary of the storm was included in Weather

Bureau (1911). 11) At Galveston at 10:25 A.M. Jul. 21 the wind was from the E. and at 10:50 A.M. attained a velocity of 68 mph for 5 minutes. During this high velocity a gust of one-minute duration occurred at a rate of 78 mph. The lowest pressure at Galveston was 29.56 inches at 10:05 A.M. At 7 A.M. the barometer reading was 29.76 inches and recovered to about the same value (29.75 inches) at 2 P.M. (Monthly Weather Review, Jul. 1909). Author's note: Weather Bureau (1911) gave the minimum pressure at Galveston as 29.53 inches, but the difference can be accounted for by the fact that this latter value was not corrected to sea level. 12) Table shown an estimated pressure of 958 millibars (28.29 inches) when the storm center made landfall on the Texas coast (Simpson and Riehl, 1981). Author's note: The table was taken from Hurricane Experience Level of Coastal County Populations -Texas to Maine, MWS Southern Region Tech. Rept. 12, 1975 by P.J. Hebert and G. Taylor. 13) Galveston, Jul. 21. Fortified behind her seventeen-foot sea wall, and elevated to a point about the danger line, Galveston today passed safely through a hurricane that resembled the disastrous storm of 1900 (The New York Times, Jul. 22, 1909, p.2, col.4). 14) Storm of Jul. 21, 1909. Velasco, Tx., Major, 41 killed (Dunn and Miller, 1960). 15) Map showing a track for the storm as follows: Morning of Jul. 18, just S.W. of extreme western Cuba; morning of Jul. 19, near 23.5 N., 88 W.; morning of Jul. 20, near 26.5 N., 91 W.; morning of Jul. 21, near 27.5 N., 94.5 W.; evening of Jul. 21, near 28.5 N., 98 W.; morning of Jul. 22, near 29.5 N., 99.5 W. (Monthly Weather Review, Jul. 1909). 15) A storm was first observed near 12 N., 60 W. on Jul. 13, 1909 and lasted 9 days; it was last observed near 30 N., 100 W. (Mitchell, 1924). Author's note: Tracks for this storm in Tannehill (1938) and Neumann et al. (1993) were found to be similar to the corresponding track in Mitchell (1924).

On the basis of information in the above items, the author of this study introduced a number of modifications along the track for Storm 3, 1909 in Neumann et al. (1993). As no indication of a closed cyclonic circulation was revealed by the Caribbean data over the period Jul. 13-16 (item 1), the author decided to start his track on Jul. 17 instead of on Jul. 13 as in the above publication. The author's 7 A.M. Jul. 17 position was based on information in items 1) through 3) and was estimated near 17.0 degrees N., 80.0 degrees W.; this position was found to be about 150 miles to the S.S.E. of the corresponding one in Neumann et al. (1993). The author's 7 A.M. Jul. 18 position was based on information in items 1) and 4) and was estimated near 21.0 degrees N., 84.0 degrees W.; this position was about 90 miles to the S.E. of the corresponding one in the above publication. The author's 7 A.M. Jul. 19 position was based on information in item 1) and was estimated near 25.0 degrees N., 87.5 degrees W.; this position was about 50 miles to the N.E. of the corresponding position in the above publication. The author's 7 A.M. Jul. 20 position was based on information in items 1) and 8) and was estimated near 27.0 degrees N., 90.5 degrees W.; this position was about 40 miles to the N.N.E. of the corresponding one in the above publication. 7 A.M. positions for Jul. 21 and Jul. 22 in Neumann et al. (1993) were supported by an analysis of information for those days in items 1), 10) and 11) and, therefore, were kept unchanged. The author's track for Storm 3, 1909 is shown in Fig. 1.

The hurricane status that Neumann et al. (1993) gave to this storm was found to agree with information contained in several of the 16 items above and, as a matter of fact, specific information in items 12) and 14) showed that the storm was a major hurricane. Hurricane intensity was introduced along the author's track very early on Jul. 19 on the basis of a ship report showing a S.E. force 10 wind on the Beaufort scale at 8 A.M. observation time (item 1) and suggesting a significant intensification of the storm from the previous day; such hurricane intensity was maintained until the storm had moved about 80 miles inland by late Jul. 21. Then, the storm was quickly downgraded to tropical storm status and to the depression (dissipation) stage. Tropical storm status was also shown along the author's track for the entire period Jul. 17-18.

Storm 4, 1909 (Aug. 6-10), T. S.

The following information was found in relation to this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Jul. 27, two ships near 17 N. and between 51 W. and 53 W., with E. to E.N.E. winds f. 4-5 and pressures 30.03- 30.09 inches; ship near 8 N., 48 W., W.S.W, f. 4, 30.03, drizzle; a disturbance, if any, was most likely embedded in the ITCZ. Jul.

28-29, no evidence of a closed cyclonic circulation in the few data E. of the Windward Islands. Jul. 30-31, no evidence of a closed circulation in the sparse data in the E. Caribbean Sea (Historical Weather Maps, Jul. 1909). Author's note: In this item and in item 2), wind forces (f) are on Beaufort scale and pressures are in inches. 2) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Aug. 1-4, no closed circulation could be supported by the Caribbean data which were available. Aug. 5, ship near 13 N., 71 W., S.W. f. 2, 30.09 (wrong pressure); Kingston, N. f. 1, 29.91; ship near 15 N., 77 W., E. f. 2, showers; data allowed for a possible center near 15 N., 73.5 W. but this is questionable. Aug. 6, Kingston, S.E. f. 2, 29.90; ship near 17.5 N., 75 W., S.E. f. 5; ship near 20.7 N., 81.8 W., E. to E.N.E. f. 3, 29.71 (probably too low); center placed on map near 19.5 N., 82.5 W., but near 18 N., 80.5 W. was perhaps a somewhat better location. Aug. 7, Kingston, S.E. f. 4, 29.95; ship near 21 N., 84 W., S. f. 2, 29.65 (probably too low); center just W. of the ship. Aug. 8, Merida, N.E. f. 2, 30.05 (it could be in error); ship near 22 N., 87 W., E. f. 5, 29.94; center probably near 20.5 N., 88.5 W. (over Yucatan). Aug. 9, ship near 22 N., 89 W., E.S.E. f. 6, 29.96; Merida E.S.E. f. 4, 29.83; Tampico, N. f. 3, 29.78; Veracruz, S.W. f. 1, 29.71; center probably near 20.5 N., 92.5 W. Aug. 10, Tampico, S. f. 2, 29.73; Mexican station N.W. of Tampico, N. f. 5, 29.88; center probably near 23 N., 98.5 W. (Historical Weather Maps, Aug. 1909). 3) On Aug. 9 reports from Yucatan and the Mexican Gulf coast indicated the presence of a disturbance of marked intensity near or west of the northern point of Yucatan or in the Gulf of Campeche. By the following morning the center of the disturbance had apparently moved inland in the vicinity of Tampico after which it appeared to pass inland and dissipate in heavy rains in the mountain districts during Aug. 10-11 (Monthly Weather Review, Aug. 1909). Author's note: Taken from a monthly report prepared by E.B. Garriott.

On the basis of information in the above items, primarily in items 1) and 2), the author of this study introduced a number of modifications along the track for this storm in Neumann et al. (1993), which is the only one known to the author and which was started as early as Jul. 27. On the basis of information in items 1) and 2), the author decided to start his own track on Aug. 6 and the reason for the late start with respect to the above publication was that no definitive indication of a cyclonic circulation was found in the data in late July and early Aug. The author's 7 A.M. Aug. 6 position was estimated near 18.0 degrees N., 80.5 degrees W., although it should be admitted that he had a low confidence in that position. His 7 A.M. Aug. 7 position was estimated near 21.0 degrees N., 84.3 degrees W. on the basis of a nearby ship observation (item 1) and his confidence in that position is much higher than in the one for Aug. 6. Author's 7 A.M. positions for the period Aug. 8-10 were as follows: Aug. 8, near 20.5 degrees N., 88.5 degrees W.; Aug. 9, near 20.5 degrees N., 92.5 degrees W.; Aug. 10, near 23.0 degrees N., 98.5 degrees W. The difference between author's positions and the corresponding positions in Neumann et al. (1993) was found to range from 240 miles on Aug. 7 to about 130 miles on Aug. 9-10. The author's track for Storm 4, 1909 is shown in Fig. 1.

Since no wind of force 8 or higher was found to be associated with this weather system (items 1 and 2), the tropical storm status that Neumann et al. (1993) gave to it could not be rigorously checked. However, that status was accepted by the author of this study on the basis of the terminology "disturbance of marked intensity" used in item 3). In spite of that the system probably did not reach tropical storm intensity until Aug. 9, such intensity was denoted along the author's track over the period Aug. 6-10. The depression (dissipation) stage was introduced in the morning of Aug. 10, when the system was over N.E. Mexico.

Storm 5, 1909 (Aug. 20-28), H.

The following information was found about this storm: Aug. 20, Barbados, N.W. f. 2, 29.95; ship near 13 N., 54 W., S.E. f. 4, rain; ship near 11 N., 57 W., W. f. 4; ship near 11 N., 58 W., N.E. f. 5, 29.94 (probably wrong position or data); ship near 21 N., 60 W., E. f. 4; center probably near 15.5 N., 56.5 W. Aug. 21, Barbados, W.S.W. f. 4, 29.91; ship near 12 N., 58 W., S. f. 6; ship near 11 N., 57 W., S.W. f. 4; Martinique, W.S.W. f. 2, 29.88; Dominica, calm, 29.86; ship near 19 N., 63 W., N.E. f. 5; center probably near 16.5 N., 60.5 W. Aug. 22, ship

(or station) near 18 N., 63 W., S.E. f. 9, 29.86; San Juan, N.E. f. 5, 29.72, heavy rain; center placed near 17.3 N., 65 W., (probably a bit far E.). Aug. 23, Turks Is., S.E. f. 5, 29.78; Santo Domingoo, S. f. 6, rain; ship (or station) near 20 N., 72.5 W., E.N.E. f. 7; ship near 17 N., 73 W., N.W. f. 6; Kingston, N.W. f. 2, 29.77; center appears to be near 18.3 N., 72 W., although it was a bit farther N. according to other sources which placed it over northern Haiti. Aug. 24, ship or station near 18 N., 77 W., S. f. 5; Kingston, E. f. 3, 29.79; Havana N.E. f. 3, 29.82; ship near 20 N., 84 W., N. f. 4; ship near 16 N., 83 W., W.N.W. f. 2, 29.91; center placed near 20 N., 79.5 W. Aug. 25, ship near 23.8 N., 85 W., E. f. 9; Havana, E.S.E. f. 3, 29.89; Merida, N. f. 4, 30.18 (wrong pressure); ship near 16.7 N., 87 W., W.S.W. f. 6, rain; ship near 20 N., 79 W., S.E. f. 6; center near 20.5 N., 85.5 W. Aug. 26, Merida, S. f. 2, 29.90; ship near 24 N., 85 W., E. f. 8; Havana, E. f. 2, 30.00; ship near 20 N., 82 W., S. f. 6, 29.97; center placed 19.5 N., 91.5 W.; however, it is likely that in reality was near 22 N., 91 W. Aug. 27, Tampico, W. f. 5, pressure could not be read; ship near 24 N., 97 W., N.E. f. 12; center placed on map near 25 N., 94 W., but it should have been near 23.5 N., 96.7 W., just to the S.S.E. of the ship. Aug. 28, Tampico, S. f. 4, 29.84; ship near 24 N., 96 W., S.E. f. 12, 29.68; Brownsville, E.S.E. no speed, 29.76; center near 25 N., 98.7 W., probably a bit N. (Historical Weather Maps, Aug. 1909). Author's note: Wind forces (f) are on Beaufort scale and pressures are in inches. 2) A storm showed marked intensity during its passage over the Caribbean Sea and caused an enormous loss of life and property in northern sections of Mexico. This hurricane appeared E.N.E. of Barbados on Aug. 20 and advices were then issued that that it would probably move on a westerly course. By the morning of Aug. 21 the center advanced to the vicinity of Martinique from which position it moved westward and on the morning of Aug. 22 was central to the S. and apparently near Puerto Rico. On Aug. 23 there appeared to be two cyclonic centers moving on a N. of W. course, one over the Windward Passage and another, a secondary or "twin" storm south of Haiti. On Aug. 23 the storm caused great loss of property on the Mole St. Nicholas, Haiti, many houses being wrecked by high easterly gales and by waves that rolled in from the bay. During Aug 24 the southern provinces of Cuba were visited by heavy winds and rains that caused considerable property damage and in the afternoon a wind velocity of 60 mph from the N.E. was reported at Havana. On Aug. 25 the steamship "Cartago" was obliged to heave to 13 hours in the Yucatan Channel with wind blowing at an estimated velocity of 100 mph, beginning in the morning from the N.E. and shifting shortly after noon to the E. by S.E. and continuing from that quarter during the afternoon. The position of the "Cartago" in the Channel, 25 miles off the Yucatan coast, with hurricane winds and high seas that dashed over the ship, was one of extreme peril. Damage, however, was of a minor character. The morning of Aug. 26 the captain sent an account of the storm by wireless to Burwood, La. This was the first instance of a storm experience at sea that was transmitted in season to be utilized in forecast work. Following a W.N.W. course from the Yucatan Channel the hurricane center reached a position in the Gulf off and probably S.E. of the mouth of the Rio Grande River by the morning of Aug. 27 and then moved inland near the mouth of the Rio Grande, attended by excessive rains than caused an enormous loss of life and property by flood in northeastern districts of Mexico. Messages received from the Point Isabel Life-Saving Station on Brazos Island indicated the character of the storm at that point. A late message was as follows: "This vicinity struck by a violent hurricane. Keeper and crew compelled to abandon station. Stopped at Tarpon Beach, and rescued all people on surf boats and brought them over to Point Isabel Station in a dangerous condition. Keeper and crew still at Isabel. Heavy weather" (Monthly Weather Review, Aug. 1909). Author's note: Taken from a report prepared by E.B. Garriott. Other brief reports about the storm were published in Tannehill (1938) and Weather Bureau (1911). 3) Belen College Observatory, Aug. 21, 10:30 A.M. The new cyclonic perturbation is apparently located E. of Martinique; nothing is known so far about its intensity. This forecast was wired to Washington at 9 A.M. today. L. Gangoiti, S.J. (Diario de la Marina, Havana, Aug. 21, 1909, evening edition, p.4, col.1) 4) Belen College Observatory, Aug. 22, 1 P.M. The cyclonic perturbation will probably pass today over Puerto Rico from S.E. to N.W., with notable intensity. At 7 A.M. this morning its center was to the S.S.W. of St. Thomas, near Vieques Island as we have cabled to Washington and other places. L. Gangoiti, S.J. (Diario de la Marina, Havana, Aug. 23, 1909, morning edition, p.4, col.1). 5) Washington, Aug. 21.

Conditions continued threatening over the West Indies and a well defined disturbance is moving W. from the vicinity of Martinique (The New York Times, Aug. 22, 1909, p.17, col.7). Author's note: The above statement was probably issued in the night of Aug. 21. 6) Belen College Observatory, Aug. 23, 5 P.M. The center of the perturbation was near Baracoa at noon today as we have cabled to Washington; by 3 P.M. it had advanced to the W. of that town. We have received from Washington, with some delay, the following telegram: "Hurricane center near and S. of Haiti, moving to W. one quarter to N.W; it will be severe in Cuban waters and probably Jamaican ones during the next 24 hours". L. Gangoit, S.J. (Diario de la Marina, Havana, Aug. 24, 1909, morning edition, p.5, cols. 4-5). 7) Guantanamo, Aug. 24, 8 P.M. During yesterday the atmosphere showed a cyclonic character, but the S. wind cleared the clouds; the thermometer (it should read barometer) rose some degrees (lines) after having shown "tempestad" or storm (Diario de la Marina, Havana, Aug. 25, 1909, morning edition, p.9, col.2). 8) Cienfuegos, Aug. 24. Last night and this morning the weather was cyclonic with gusty winds and rain at times. The remaining of the day the weather was the same but the rain ceased. Father Sarasola of the Monserrat College indicated that the cyclone was over the western portion of Camaguey. According to the last observations the cyclone is encountering some resistance and tends to shift southward (Diario de la Marina, Havana, Aug. 25, 1909, morning edition, p.9, col.5). 9) Belen College Observatory, Aug. 25. At 7 A.M. Aug. 23 our observations from Port-au-Prince, Jamaica, Guantanamo and Santiago de Cuba allowed one to locate the center of the perturbation over northern Haiti; at noon had already reached the vicinity of Baracoa and during the afternoon and night advanced over the entire province of Santiago de Cuba, the vortex having moved back to sea near Santa Cruz del Sur. At 4 P.M. yesterday the vortex was between the meridians of Cienfuegos and Havana, passing to the S. and not far away. At 6 A.M. this morning the vortex was over the extreme western Cuba and the Yucatan Channel, passing to the Gulf (Diario de la Marina, Havana, Aug. 25, 1909, evening edition, p.4, col.1). 10) Camaguey, Aug. 24, 4 P.M. The mayor of Santa Cruz del Sur sent a telegram as follows: A strong tempest is affecting us since the early morning; there has been some improvement now at 2 P.M. (Diario de la Marina, Havana, Aug. 25, 1909, evening edition, p.4, col.2). 11) Caimanera, Aug. 24, 11 A.M. Yesterday strong winds and intermittent showers were felt; by night wind and showers increased. It looked good at daybreak today (Diario de la Marina, Havana, Aug. 25, 1909, evening edition, p.4, col.2). 12) Batabano, Aug. 25, 2:20 P.M. Yesterday, variable weather with dropping barometer. Drizzle accompanied by N.E. gusts. Wind increased much by night, specially around 12:30 A.M. By daybreak today, heavy showers and gusty winds from the S. (Diario de la Marina, Havana, Aug. 26, 1909, morning edition, p.8, col.1). 13) Washington, Aug. 24. The disturbance in the West Indies was reported Tuesday afternoon (Aug. 24) to the S. of western Cuba and moving W.N.W. At Havana the wind reached a velocity of 60 mph (The New York Times, Aug. 25, 1909, p.14, col.7). 14) Washington, Aug. 25. The disturbance has entered the Gulf of Mexico by the Yucatan Channel and it is probably moving N.W. (The New York Times, Aug. 26, 1909, p.13, col.7). 15) Washington, Aug. 26. Storm warnings are displayed from Apalachicola to Port Isabel, Tex. A wireless message from the steamship "Cartago" reports that this vessel encountered a hurricane of great intensity in the Yucatan Channel Wednesday night, Aug. 25 (The New York Times, Aug. 27, 1909, p. 12, col.7). 16) The cyclone of Aug. 21-28 affected the Island of Hispaniola (Garcia-Bonnelly, 1928). 17) Aug. 23-25, 1909. Cyclone of medium intensity along all the island (of Cuba). It entered through the eastern extreme of the island, went back to the Caribbean (Sea) near Camaguey, and passed S. of Havana towards the Yucatan Channel. Considerable damage was done on both extremes of the island and a number of vessels were lost, among them the steamer "Nicolas" at Isle of Pines (Sarasola, 1928). Author's note: Actually taken from the catalog of Cuban cyclones by M. Gutierrez-Lanza, which is included in Sarasola (1928). 18) Bad weather at Las Villas province due to the cyclone of Haiti, which passed between Santa Cruz del Sur and Oriente province towards the end of Aug. 1909 (Martinez-Fortun, 1942). 19) Washington, Aug. 27. The storm in the Gulf of Mexico has passed W. to near the mouth of the Rio Grande, where it is likely to pass inland and decrease in intensity. Severe gales have blown over the West Gulf coast in the past 24 hours, with a maximum velocity of 68 mph at Corpus Christi (The New York Times, Aug. 28, 1909, p. 13. col.7). 20) Monterrey, Mexico, Aug. 28. 800 persons drowned, 15000 homeless and

property damage up to \$ 2 million is the result of the flood that struck the city between 11 and 12 o'clock this morning (The New York Times, Aug. 29, 1909, p.1, col.1). 21) Maximum wind velocity was 56 mph at Corpus Christi on Aug. 27 (Monthly Weather Review, Aug. 1909). Author's note; This value is lower than the one of 68 mph mentioned in item 19). 22) Minimum pressure at Corpus Christi was 29.74, apparently without reduction to sea level (Weather Bureau, 1911). 23) Storm of Aug. 27-28, 1909. Lower Texas coast. Minimal. Major in Mexico, over 1500 killed (Dunn and Miller, 1960). 24) Map showing a track for the storm, displaying the following morning positions: Aug. 24, near 20.5 N., 79 W.; Aug. 25, near 20.7 N., 85.3 W.; Aug. 26, near 23 N., 90 W.; Aug. 27, near 24.7 N., 95 W.; Aug. 28, near 25.3 N., 101 W. (Monthly Weather Review, Aug. 1909). 25) A storm was first observed near 16 N., 60 W. on Aug. 21, 1909 and lasted 6 days; it was last observed near 27 N., 99 W. (Mitchell, 1924). Author's note: Tracks for this storm in Tannehill (1938) and Neumann et al. (1993) have some similarities with the corresponding track in Mitchell (1924). However, the track in Neumann et al. (1993) was started on Aug. 20 instead of on Aug. 21.

On the basis of information contained in the above items, the author of this study introduced a number of modifications along the track for Storm 5, 1909 in Neumann et al (1993). Based on information in item 1), the author's 7 A.M. positions for the period Aug. 20-22 were as follows: Aug. 20, near 15.5 degrees N., 56.3 degrees W.; Aug. 21, near 16.3 degrees N., 60.5 degrees W.; Aug. 22, near 17.3 degrees N., 65.7 degrees W.; for these three days the difference between the author's positions and the corresponding ones in Neumann et al. (1993) was around 45 miles. The author's 7 A.M. Aug. 23 position was near 19.0 degrees N., 72.3 degrees W. and was based on information in items 1), 6, and 9); this position was about 120 miles to the N.N.W. of the corresponding one in Neumann et al. (1993). The author's 7 A.M. Aug. 24 position was based on information in items 1) and 9) and on space-time continuity and was estimated near 20.3 degrees N., 79.5 degrees W.; this position was about 30 miles to the N.W. of the one in the above publication. The author's 7 A.M. Aug. 25 position was estimated near 21.0 degrees N., 85.5 degrees W. on the basis of information in items 1), 2) and 9); this position was a few miles to the S. of the one in the above publication. Author's 7 A.M. positions for Aug. 26-28 were primarily based on information in item 1) and were estimated as follows: Aug. 26, near 22.0 degrees N., 91.0 degrees W.; Aug. 26, near 23.7 degrees N., 96.7 degrees W.; Aug. 28, near 23.7 degrees N., 98.7 degrees W.; Aug. 28, near 24.7 degrees N., 98.7 degrees W.; the difference between these positions and the corresponding ones in Neumann et al. (1993) was found to range from about 140 miles on Aug. 27 to about 80 miles on Aug. 28. The author's track for Storm 5, 1909 is shown in Fig. 1.

The hurricane status which Neumann et al. (1993) gave to this storm was rigorously supported by ship observations showing winds of force 12 on the Beaufort scale on Aug. 27-28 (item 1) and by the wind estimate of 100 mph reported by the steamship "Cartago" when she encountered the storm in the Yucatan Channel on Aug. 25 (item 2). In accordance with item 23), the storm was a major hurricane in Mexico. Hurricane intensity was denoted along the author's track from late morning of Aug. 20 until the storm was well inland in northeastern Mexico in the morning of Aug. 28. In spite of having crossed over Hispaniola and Cuba, the author decided to keep hurricane intensity while the storm moved over both landmasses because of the considerable damage reported from Mole St. Nicholas, Haiti (item 2) and the words "cyclone of medium intensity" which were used to refer to the storm over Cuba and near that island (item 17). Tropical storm intensity was briefly shown along the author's track during the early part of Aug. 20 and in the afternoon of Aug. 28. The depression (dissipation) stage was introduced late on Aug. 28.

Storm 6, 1909 (Aug. 28-31), T. S.

The following information was found in relation to this storm: 1) Data extracted from 8 A.M. Historical Weather Maps: Aug. 27, Turks Is., calm, 29.96; ship near 26 N., 74 W., N.N.E. f. 2, 29.94; a closed cyclonic circulation may or may not have existed. Aug. 28, Jupiter, N.E. f. 5, 29.91; ship near 23 N., 73.7 W., S. f. 3; center placed 26.5 N., 76 W. Aug. 29, Jupiter, S.E. f. 4, 29.86; Tampa, N.E. f. 3. 29.93; Jacksonville, N. f. 3, 30.00. Aug. 30, Jupiter, W.S.W. f. 4,

29.94; Tampa, N.E. f. 2, 29.89; Jacksonville, E.N.E. f. 2, 29.95; weak low near Tampa, incorporated to a front as drawn on the map; however, no temperature contrast was noted. Aug. 31, low placed near 31 N., 79 W.; the low was shown as a frontal one, but no temperature below middle 70's was found around the low (Historical Weather Maps, Aug. 1909). 2) From Aug. 27 to Aug. 30 a shallow barometric depression advanced from the Caribbean Sea S. of Haiti northwestward to the Florida Peninsula and at the close of the month was central off the N.E. Florida coast (Monthly Weather Review, Aug. 1909). 3) Belen College Observatory, Aug. 28, 10:30 A.M. The cirrus convergence and direction indicated this morning the existence of a perturbation to the E.N.E. and far from Havana, towards the Bahamas. We have just received the following message from Washington: "Advisory at 10 A.M. For Miami and Jupiter, strong N.E. winds; perturbation center apparently S.E. of Andros Island, moving N.W. Moore". L. Gangoiti, S.J. (Diario de la Marina, Havana, Aug. 28, 1909, evening edition, p.4, col.1). 4) The maximum wind velocity at Savannah was N.E. 40 mph on Aug. 31 (Monthly Weather Review, Aug. 1909). 5) Map showing a track for this weather system starting near 23 N., 76.5 W. in the morning of Aug. 28, reaching a position near 28.5 N., 84.5 W. by the evening of Aug. 30 and ending off the coast between Savannah and Charleston in the evening of Aug. 31 (Monthly Weather Review, Aug. 1909). Author's note: The minimum pressure written down along the track was 29.82 inches. 6) A storm was first observed near 20 N., 67 W. on Aug. 27, 1909 and lasted 4 days; it recurved near 29 N., 82 W. and it was last observed near 29 N., 82 W. (Mitchell, 1924). Author's note: Tracks for this weather system in Tannehill (1938) and Neumann et al. (1993) were found to be similar to the one shown in Mitchell (1924).

On the basis of information in the items above, particularly in item 1), the author of this study introduced some modifications along the track shown in Neumann et al. (1993). The author's track was started on Aug. 28 instead of on Aug. 27 because of the uncertainty about the existence of a closed circulation on the last day mentioned (item 1). Author's 7 A.M. positions were estimated as follow: Aug. 28, near 26.5 degrees N., 76.0 degrees W.; Aug. 29, near 26.5 degrees N., 80.5 degrees W.; Aug. 30, near 27.5 degrees N., 81.7 degrees W.; Aug. 31, near 31.0 degrees N., 79.0 degrees W. The difference between these positions and the corresponding ones in Neumann et al. (1993) was found to range from about 160 miles on Aug. 29 to about 90 miles on Aug. 30. The author's track for Storm 6, 1909 is shown in Fig. 1.

Because the only support for tropical storm intensity was the maximum wind velocity of N.E. 40 mph reported to have occurred at Savannah on Aug. 31 (item 4), the minimum pressure estimated along the track was 29.82 inches (item 5 and corresponding author's note) and the words "shallow barometric depression" were used to describe the alleged storm (item 2), the author of this study is somewhat skeptical about the merit of considering this weather disturbance as a tropical storm. Nevertheless, he decided to accept that classification as given by Neumann et al. (1993) and, therefore, tropical storm status was denoted along his track over the period Aug. 28-31. The depression (dissipation) stage was introduced late in the morning of Aug. 31.

Storm 7, 1909 (Sept. 14-21), H.

The following information was found about this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: No closed cyclonic circulation was found before Sept. 14. Sept. 14, Kingston, S.S.E. f. 1, 29.87; ship near 18 N., 74 W., S. f. 5, 29.86; ship off the eastern tip of Cuba, S.E. f. 5, 29.86, rain; ship near 22 N., 76 W., E. to E.N.E. f. 5, 29.97; possibility of a center between Jamaica and eastern Cuba, based on wind directions reported by ships and the very light wind at Kingston. Sept. 15, Kingston, E.S.E. f. 5, 29.85; ship near 16 N., 76 W., E.S.E. f. 5, 29.86; ship near 11 N., 81 W., N.W. f. 2; circulation center inferred near 14 N., 78 W., but indications from other sources were that the storm was much farther N., near Grand Cayman. Sept. 16, Havana, E. f. 4, 29.86; ship near 19 N., 79 W., S. f. 7, rain; Kingston, S.E. f. 3, 29.84; ship near 15.2 N., 76.8 W., S.S.E. f. 2; ship near 12 N. 78 W., S.S.E. f. 2, 29.86; center placed 18.5 N., 81.3 W. (too far S. and probably a bit E.). Sept. 17, Havana, E. f. 6, 29.74; ship near 21 N., 80 W., S. f. 7, 27.74; center placed 20.5 N., 80.5 W. (too far S. and E.). Sept. 18, Havana, E.S.E. f. 4, 29.82; Cuban station near 22.3 N., 83.8 W.

(Pinar del Rio), E.S.E. f. 9, pressure could not be read; ship near 24 N., 85 W., E.N.E. f. 7, 29.47; ship near 19.8 N., 80 W., S.W. f. 4, 29.80; ship near 21.8 N., 87 W., N. f. 8; center placed 22.3 N., 85 W. (obviously too far S.). Sept. 19, ship near 26 N., 88 W., E. f. 8, 29.74; ship near 24 N., 85 W., S.E. f. 7, 29.68; ship near 22 N., 88 W., S.W. f. 4,; center placed 23.5 N., 87.3 W., too far S. and a bit E., near 25 N., 88 W. appears to be better. Sept. 20, ship or station on the southern coast of the Mississippi Delta, E.N.E. to N.E. f. 9, pressure could not be read; ship near 27.7 N., 91.7 W., W. f. 11; center placed N.N.E. of the ship, but that position appears to be too far W. when taking into account the second ship (or station) and information from other sources; a position near 28.3 N., 90 W. appears to be better. Sept. 21, center of the low near the place where borders of La., Ak. and Mi. meet (Historical Weather Maps, Sept. 1909). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 2) National Observatory, Sept. 14, 4 P.M. A cablegram from the Weather Bureau of Washington at 2:40 P.M. announces that there is a perturbation between Jamaica and eastern Cuba, which is apparently moving to the W. one quarter to N.W. Its diameter is small and it is of marked intensity (Diario de la Marina, Havana, Sept. 15, 1909, morning edition, p.3, col.6). Author's note: The same newspaper published a bulletin from the Belen College Observatory at 5:30 P.M. Sept. 14, referring to this system as a secondary cyclone, generally of a short radius and unknown intensity. 3) Belen College Observatory, Sept. 15, 8 A.M. At 7:30 P.M. last night we sent a cablegram to the Central Observatory of Mexico indicating that there was a perturbation to the E. of Grand Cayman and at 7:30 A.M. this morning we sent them another cablegram saying that it was near Grand Cayman. The storm remains at a good distance from us and its vortex will pass to the Gulf of Mexico, from today to tomorrow, where it could gain in organization (Diario de la Marina, Havana, Sept. 15, 1909, evening edition, p.4, col.1). 4) National Observatory, Sept. 15, 11 A.M. The perturbation is moving towards the S. of Isle of Pines, heading for the Yucatan Peninsula. It gave abundant rains over Oriente (province); there is no danger for the Republic (Diario de la Marina, Havana, Sept. 15, 1909, evening edition, p.4, col.1). 5) Washington, Sept. 16. A tropical storm is apparently moving toward the western Cuban coast or Yucatan Channel (The New York Times, Sept. 17, 1909, p.13, col.7). 6) From Belen College Observatory. The following communication from Father Gangoiti was received at the Presidential Palace yesterday: Sept. 17. Mr. Jose M. Gomez. Honorable President. At 1 P.M. yesterday Sept. 16 we sent this cablegram: Dr. Gomis- Pinar del Rio: Storm center will cross over western provinces. Be on the alert. The sane cablegram was also sent to Dr. Camejo at Remates de Guane. We have sent this morning (Sept. 17) special telegrams to the Meteorological Service of Mexico and the Weather Bureau, saying that the cyclone was entering Pinar del Rio (province). At 10 A.M. this morning (Sept. 17) we published that the vortex would pass to the Gulf of Mexico over or near the capital city of Pinar del Rio. Under these circumstances we were not surprised by the news you communicated to us. The weather continues improving at this time, 6 P.M., as we have announced to the press this morning; the cyclone is moving away from us. L. Gangoiti, S.J. (Diario de la Marina, Havana, Sept. 18, 1909, evening edition, p.4, col.1). 7) National Observatory, Sept. 18, 10 A.M. According to data received from the observers at Pinar del Rio and Herradura, the center of the tempest passed to the S. of that city (Pinar del Rio) before noon yesterday, causing torrential rains which have overflowed the rivers in the western portion (of Cuba). Because of this reason and the violent winds serious damage has occurred, without knowing details as yet. The tempest is to the W.N.W. of this capital (Havana), and also to the N. of the Yucatan peninsula, at the present time (Diario de la Marina, Havana, Sept. 18, 1909, evening edition, p.4, col.1). 8) Washington, Sept. 17. The tropical hurricane is now centered over western Cuba, apparently moving N.W. Gales and heavy seas are already reported from Sand Key and western Cuba. Hurricane warnings are displayed at Key West, Jupiter and Tampa (The New York Times, Sept. 18, 1909, p.14, col.7). 9) Extracted from a communication sent to the Civil Governor by the Mayor of Nueva Gerona, Isle of Pines, on Sept. 17. The new cyclone which began affecting us since yesterday afternoon (Sept. 16) with more violence than the one of last Aug., became stronger in the early morning hours (Sept. 17) and caused great damage to buildings and the loss of orange crops. The steamer "James C. Cambell" and some small vessels came ashore but they have been refloated (Diario de la Marina, Havana, Sept. 20, 1909, evening edition, p.4, col.2). 10) The steamboat "Gussie", from

Mobile to Port of Spain was taken by surprise by the bad weather of Sept. 17 between Cape Frances and Isle of Pines at about midnight (Sept. 16-17). She was fighting the storm from 28 hours (Diario de la Marina, Havana, Oct. 6, 1909, evening edition, p.1, col.1). 11) National Observatory, Sept. 18, 4 P.M. The following message was received at the observatory last night: "Pinar del Rio, 6:10 P.M. An urgent telegram was received stating that the cyclone would pass over this city tonight. Although I understand that the vortex passed between 10 and 11 A.M. this morning, with a barometer drop to 741 millimeters (29.17 inches), I am in doubt and, please, let me know about this matter. Alfredo Portas, Mayor". As our observations and those sent to us by the Dept. of Agriculture showed that the storm center had passed S. of Pinar del Rio before midday, we replied to the mayor accordingly (Diario de la Marina, Havana, Sept. 19, 1909, morning edition, p.4, col.4). 12) The barometer began to fall over the Lesser Antilles Sept. 10 and from Sept. 12 to Sept. 14 a depression of apparently slight intensity moved westward over the Caribbean Sea. On the morning of the latter date two centers of cyclonic action appeared, one N. and the other S. of Jamaica. By the following morning the northern depression had apparently dissipated and the one to the southward of Jamaica had increased in intensity and was moving N.W. toward the Yucatan Channel where it arrived the morning of Sept. 17. At that time the barometer at Pinar del Rio, Cuba, read 29.44 inches, the wind had attained a velocity of 60 mph from the N.E. and a 24-hr rainfall of 7.88 inches was reported. Reports indicate that the storm damage at Pinar del Rio Province aggregated about \$ 1 million (Monthly Weather Review, Sept. 1909). Author's note: The above information was taken from a report written by E.B. Garde. The statement indicating that the northernmost center observed on Sept. 14 to the north of Jamaica had dissipated by the next day, and that the center to the S. of that island intensified and moved N.W. appeared to be in error. On the basis of information in items 2) through 4), intensification of the northernmost center was apparently the one which occurred in reality, following the pattern most frequently observed in the development of tropical cyclones. 13) Taken from a communication written by the Mayor of Manta on Sept. 19: From 3 A.M. Sept. 17 until today's early morning, a strong cyclone, as previously announced, has struck here. Its effects were felt more intensively from 9 A.M. to 3 P.M. Friday (Sept. 17), followed by a calm for 4 hours, and beginning again at 7 P.M. and lasting until 1 A.M. (Sept. 18). Then, heavy rain continued Saturday and Saturday night (Sept. 18) until this morning (Diario de la Marina, Havana, Sept. 21, 1909, evening edition, p.4, col.2). Author's note: Manta is a town located in the western portion of Pinar del Rio province. 14) La Esperanza, Sept. 20, 3 P.M. I arrived (here) from Dimas. Vortex of the cyclone of Sept. 17 passed over us, preventing any forward motion (of the vessel) and, in spite of using three anchors, we drifted 3 miles. The sea swept over the deck, being impossible to remain on it at 4 P.M. Barometer read 750 millimeters (29.53 inches) at 10 A.M. and dropped to 732 millimeters (28.82 inches) at 4 P.M., a drop of 3 millimeters per hour, a larger hourly drop but identical depression than in the cyclone of Sept. 4, 1888. The vessel suffered much, and the engine became useless; I reached Dimas under great difficulties. I met the "Cespedes" there. Commander of the "Cespedes" and myself decided to tow the vessel to Esperanza. Lt. Rivera, Commander "Alacran" (Diario de la Marina, Havana, Sept. 21, 1909, evening edition, p.4, col.2). Author's note: La Esperanza and Dimas are located on the northwestern coast of Pinar del Rio province. The exact location where the "Alacran" met the storm was not given but it should have been not very far from Dimas. The above message from Lt. Rivera of the "Alacran" was received at the Cuban Dept. of Treasury. 15) Sept. 16-17, 1909. Intense hurricane crossed over Pinar del Rio (province) near its capital (City of Pinar del Rio). Enormous damage to towns and the country side (Sarasola, 1928). Author's note: Actually taken from the catalog of Cuban cyclones by M. Gutierrez-Lanza which is included in Sarasola (1928). 16) Cyclonic weather at Las Villas (central Cuba) due to the intense hurricane of Sept. 16-17, 1909 at Pinar del Rio (Martinez-Fortun, 1942). 17) Washington, Sept. 18. Rains have occurred in the S.E. States in connection with the tropical storm now central in the middle Gulf, moving N.W. (The New York Times, Sept. 19, 1909, p.19, col.7). 18) Washington, Sept. 19. The tropical storm has continued its movement N.W. and is now apparently centered in the Gulf, S. of the Louisiana coast. A wind velocity of 40 mph was reported from Burwood and strong sea swells on either side at Pensacola and Galveston. Hurricane warnings are displayed along the Louisiana coast and storm warnings at other stations in the middle Gulf region (The New